

Existing Condition of Urban Mobility in Kathmandu Valley

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ABSTRACT: *Mobility of the city is very important for livable cities. General impression of the people regarding the urban mobility in Kathmandu Valley is very bad. Perception of the people is gathered through the questionnaire from people of Kathmandu. Various indicators are grouped in six categories namely - environmental criteria, social/cultural sustainability, economic criteria, infrastructure/engineering/technological, institutional sustainability and good governance. Questionnaire survey was conducted to assess the people's perception of three districts of Kathmandu Valley. This study deals the people's perception. Finding of the study will be useful for developing the sustainability criteria for urban transportation and consider the various policy decision regarding the efficient mobility of Kathmandu Valley. Finding shows that mobility situation of Kathmandu Valley is not good and indicates the need of improvement.*

KEY WORDS: *Urban mobility, sustainable transportation, sustainability criteria, Kathmandu Valley*

I. INTRODUCTION

"Development" can be the evolution of living standards and the achievement of ideal conditions in the field of economic, social and cultural which bring the realization of the concepts of freedom, justice, social mobility, human development and economic, social, and cultural growth. Also, the development is considered as discovering methods to achieve evolutionary movement, and it makes the phenomenon of social, economic and cultural well-balanced and harmonious, as well it provides modern conditions for social, economic mobility and social justice achievement (SOCIAL JUSTICE) provides (Zahedi Asl, 2002). Good land use planning requiring minimum need to travel, transportation network friendly for all classes of people, transportation modes causing minimum amount of air pollution, and transportation options demanding least cost and effort of people can be considered as various aspects of a sustainable transportation system. Thus, sustainable transportation concerns with the impacts of transportation developments on economic efficiency, environmental issues, resource consumption, land use, and equity. It includes the application of systems, policies and technologies, which would help achieve the continuous economic development without having a detrimental effect on environmental and human resources. Comprehensive Sustainability criteria were not explored and used for planning, developing and managing the urban mobility Kathmandu. Therefore, this research is intended to dig these issues, arrive at the finding and recommend the sustainability criteria for urban transportation and recommend that how transport infrastructure so that the quality living of city dwellers could be well managed sustainability in terms of mobility aspect. At the same time, it is worth noting that in Kathmandu there have been relatively few research studies undertaken, which are needed to underpin responsible and rational national level planning and management. To ensure implementation of sustainable development it is important that approaches and criteria are developed for the evaluation of the nature/character of development. Therefore, an important goal of research is the formulation of sustainable development indicators, that reflect the effectiveness and positive aspects and negative impacts of development and that permit an evaluation to be undertaken of required changes in the way of doing things.

Due to unequal distribution of transport infrastructure, with many other disparity, economic opportunities and access within the valley is extremely high within the people of valley. Inadequate infrastructure in Kathmandu to cater the need of growing population valley is the major challenge. This unbalance in transport opportunities for the different income groups results in social inequity. The Sustainable Cities Program (SCP) is a program of UN-Habitat and the United Nations Environment program me (UNEP). These two organizations work to build capacity for urban environmental planning and sustainable development management in cities. Sustainable Cities Program me, 1999 states that

"The SCP does not view environmental deterioration as a necessary or inevitable consequence of rapid urban growth; equally, the SCP does not consider financial resource constraints to be the primary cause of environmental problems. Instead, the SCP considers environmental deterioration to be primarily caused by: 1) inappropriate urban development policies and policy implementation; 2) poorly planned and managed urban growth which does not adequately consider the constraints (and opportunities) of the natural environment; 3) inadequate and inappropriate urban infrastructure, both in terms of investment and especially in terms of

operations, maintenance and management; and 4) lack of coordination and cooperation among key institutions and groups. (SCP, 1999)"

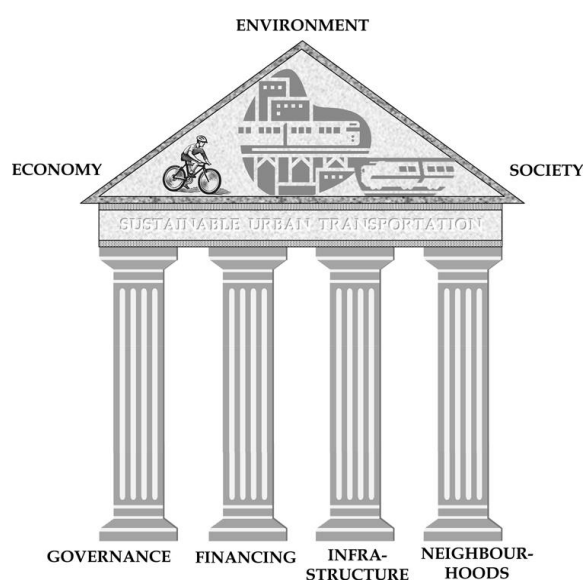
For many years it has been clear that the world faces a major problem in urban transport. Congestion in major cities has reduced traffic speeds to a crawl. Congestion is also the principal cause of excess energy use and emissions output by transport (Lowson, 2003). A report prepared for Kathmandu Sustainable Urban Transport Project funded by ADB states that "A sustainable transport system is one which is environment friendly, socially equitable, economically appropriate and affordable" and elaborates the component as follows; (WSP, 2010).

Environment friendly is measured in terms of green house gases that contribute to climate change (mostly carbon dioxide, local pollutants (such as particles and toxic materials), traffic noise and severance (barriers across local communities, for example difficulties to cross the road). Social Equity is measured in terms of peoples' ability to access basic goods, services and activities that are important or essential to society, such as emergency services, public services, health care, basic food and clothing, education and employment, improving access among all sections of society, in particular, the old, the young and women, with particular attention to the poor and disabled, and safety to all road users (reduction of accidents). Economically appropriate is measured in terms of the time taken to travel places, the operating cost of vehicles (fuel, maintenance and repairs) and the extent to which movement of goods and people promotes economic growth. Affordability is measured in terms of the amount of money available to pay for the cost of physical infrastructures (the costs of building roads, bus stations etc including the acquisition of land and property if necessary), vehicles, in particular buses and other public transport vehicles, and maintenance and operation of the above

Research paper on *The Four Pillars of Sustainable Urban Transportation* (Christopher Kennedy, 2005) nicely describes with illustration that sustainability represented by economy, environment and society are firmly supported by four pillars - governance, financing, infrastructure and neighborhoods. Four pillar concepts argued that the process of achieving more sustainable transportation requires suitable establishment of four pillars: effective governance of land use and transportation; fair, efficient, stable funding; strategic infrastructure investments; and attention to neighborhood design.

International empirical evidence and the Delhi experience indicates that metro rail systems (elevated or underground) have not delivered the goods in terms of passengers carried or social welfare and are unlikely to in cities that do not have a very dense and large central business district (Mohan, 2008). A research in Romania have used following indicators to assess the sustainability of urban development of four Romanian cities -Bucharest, Iasi, Brasov and Constanta (Christina Alpopi, May 2011);

Economic indicators: gross domestic product/inhabitant, occupied population/total population, unemployment rate of total population, number of passenger carried with public transport. Social indicators: life expectancy, infant death, number of inhabitants per physician, abandon rate in pre-university education, population density, population increase rates, house area. Environmental indicators: waste quantity generated, SO₂ quantity emitted in the atmosphere. NO₂ quantity emitted in the atmosphere annually, CO quantity emitted in the atmosphere annually and maximum noise level. Natural resources: town verdure spots area and drinking water supply.



II. METHODS

This research paradigm is post positivism. This study depends on deductive approaches to examine the sustainability criteria. The data is collected by sample survey by distributing the questioner to the vehicle uses of Bhaktapur, Kathmandu and Lalitpur Districts. The set of cultural, social, personal, and sociological factors may determine the transportation habit of people. Personal information and socio-economic conditions of the sample respondents are collected on the basis of sex, age, educational qualification, occupational status, monthly family

income, Place of residence, Ownership of vehicle, distance between residence and working place, time taken from house to office in the morning, time taken from office to house in the evening, fare from house to office in the morning, fare from office to house in evening, modes of transport from house to office in the morning, modes of transport from office to house in the evening and presented an analytical view. In data analysis demographic characteristics are often used cross tabulation and normal frequency tabulation.

III. RESULT AND DISCUSSION

Assessment of existing transportation condition of Kathmandu Valley in peoples View:

Environmental Criteria- Reduction of carbon emission, Use of clean and energy efficient vehicle, Noise level reduction, Dust level, Pedestrianization in urban core, Sidewalk, Road side greenery. **Social/Cultural**

Sustainability- Neighborhood accessibility, Ease of access, Enough walking space, Choices of transport modes, Quality of public transport vehicles, Provision of disable friendly transport infrastructure/sidewalk, Provision of enough cycle lane, Safe transport modes, Safe transport infrastructure, Reduction in congestion/Free flow mechanism, Mobility culture of commuters, Access to cultural and heritage sites, Policy to improve social harmony through comfortable urban mobility system, Operation of public transport till late evening (10 PM in sub-urban area and 11 PM in urban area), Eliminate syndicate of transport operation. **Economic Sustainability-** Affordable to the people, User pays policy, Meets life cycle cost (investment, operation & maintenance), Supportive to local business and entrepreneurship, Reduction on dependency of use of fossil fuel, Subsidize development of Non-motorized transport (NMT) infrastructures (cycle path, sidewalks and pedestrianization), PPP for development of transport infrastructure, PPP for operation of public transport systems (BRT, MRT), PPP for operation of public transport systems (BRT, MRT), Provision of budget for social infrastructures, Production of NMT modes in country.

Infrastructure/Engineering/Technical Sustainability- Urban mobility planning based on sustainable policy, Development of transport infrastructures (roads, intersections, cycle path, sidewalks), Quality of transport infrastructure, develop technical standards and norms for urban transportation, Efficient traffic management for free flow of vehicles, Use of state of the art/smart technologies.

Institutional sustainability -Coordination among government institutions responsible for planning, development, operation, maintenance, regulation of urban transport system (DOR, municipalities, traffic police, DTM) , Coordination among other institutions for operation of public transportation (vehicle operators/entrepreneurs, vehicle dealers/importers, manufacturers) , Development, formulation/updating of urban transport policy, Adopt the sustainability criteria for urban transportation/mobility, Develop necessary Acts, rules, regulations, guidelines, manuals to enforce sustainability criteria for urban transportation, Systematic operation of public transport system, Establish dedicated urban transportation unit all municipalities, Place adequate human resources (technical, managerial and administrative) in transportation unit., Train all the human resources to equip with urban transportation and mobility skill and knowledge., Establish systematic coordination mechanism with community for urban transportation and mobility.

Good governance- Community awareness in mobility, Consultation mechanism with stakeholders and community, Transparent decision making system in all levels - planning, procurement, selection, implementation, operation and maintenance, Social impact assessment, Accountability/auditing, Compliance of all guidelines - environmental, social, economical, technical, institutional, Ensure fairness in all level of decision making were the different indicators under 6 criteria and asked the respondents for the existing conditions of those indicators in Kathmandu valley.

Environmental Criteria: The view of respondents about the different indicators as a existing position under environmental criteria are presented below

Table No. 1: Indicators under Environmental Criteria- Existing

SN	Variables	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Total
		N	%	N	%	N	%	N	%	N	%	

1	Reduction of carbon emission	49	12.3	9	2.3	8	2.0	15	3.8	319	79.3	400
2	Use of clean and energy efficient vehicle	22	5.5	9	2.3	27	6.8	10	2.5	332	83.0	400
3	Noise level reduction	28	4.5	14	3.5	1	0.3	44	11	323	80.8	400
4	Dust level reduction	25	6.3	28	7.0	8	2.0	8	2.0	331	82.8	400
5	Pedestrianization in urban core	36	9	3	0.8	48	12	10	2.5	303	75.8	400
6	Sidewalk	19	4.8	2	0.5	34	8.5	40	10	305	76.3	400
7	Road side greenery	25	6.3	13	3.3	39	9.8	20	5	303	75.8	400

Source: Field Survey, 2017

On **reduction of carbon emission**, it is inferred that 12.3 percent of the respondents strongly agreed, 2.3 percent agreed, 2 percent of the respondents were neutral 3.8 percent of the respondents disagreed, and 79.3 percent of the respondents strongly disagreed. On **use of clean energy vehicle**, it is inferred that 5.5 percent of the respondents strongly agreed, 2.3 percent of the respondents agreed, 6.8 percent of the respondents were neutral 2.5, percent of the respondents disagreed and 83 percent of the respondents strongly disagreed. On **Noise level reduction** it is inferred that 4.5 percent of the respondents strongly agreed, 3.5 percent of the respondents agreed, 0.3 percent of the respondents were neutral, 11 percent of the respondents disagreed and 80.8 percent of the respondents strongly disagreed. On the **dust level reduction**, it is inferred that 6.3 percent of the respondents strongly agreed, 7 percent of the respondents agreed, 2 percent of the respondents were neutral, 2 percent of the respondents disagreed and 82.8 percent of the respondents strongly disagreed. On **Pedestrianization in urban core**, it is inferred that 9 percent of the respondents strongly agreed, 0.8 percent of the respondents agreed, 12 percent of the respondents were neutral, 2.5 percent of the respondents and 75.8 percent of the respondents strongly disagreed. On **Sidewalk**, it is inferred that 4.8 percent of the respondents strongly agreed, 0.5 percent of the respondents agreed, 8.5 percent of the respondents were neutral, 10 percent of the respondents disagreed and 76.3 percent of the respondents strongly disagreed. On **Road side greenery**, it is inferred that 6.3 percent of the respondents strongly agreed, 3.3 percent of the respondents agreed, 9.8 percent of the respondents were neutral, 5 percent of the respondents disagreed and 75.8 percent of the respondents strongly disagreed.

It is clearly revealed that majority of respondents strongly disagree about the existing indicator under environmental criteria.

Social/Cultural Sustainability: The view of respondents about the different indicators as an existing position under social/ cultural sustainability criteria are presented below

Table No. 2: Indicators under social/ cultural criteria- Existing

SN	Variables	Strongly Agree		agree		Neutral		Disagree		Strongly disagree		Total
		N	%	N	%	N	%	N	%	N	%	
1	Neighborhood accessibility	40	10	18	4.5	29	7.3	20	5	293	73.3	400
2	Ease of access	51	12.8	10	2.5	25	6.3	18	4.5	296	74	400
3	Enough walking space	58	14.5	5	1.3	10	2.5	28	7	299	74.8	400
4	Choices of transport modes	39	9.8	10	2.5	10	2.5	26	6.5	315	78.8	400
5	Quality of public transport vehicles	43	10.8	17	4.3	2	0.5	34	8.5	304	76	400

6	Provision of disable friendly transport infrastructure/sidewalk	36	9	13	3.3	15	3.8	17	4.3	319	79.8	400
7	Provision of enough cycle lane	43	10.8	9	2.3	7	1.8	27	6.8	314	78.5	400
8	Safe transport modes	57	14.3	2	0.5	2	0.5	39	9.8	300	75	400
9	Safe transport infrastructure	41	10.3	13	3.3	20	5	37	9.3	289	72.3	400
10	Reduction in congestion/Free flow mechanism	52	13	7	1.8	15	3.8	20	5	306	76.5	400
11	Mobility culture of commuters	44	11	17	4.3	34	8.5	20	5	285	71.3	400
12	Access to cultural and heritage sites	56	14	8	2	10	2.5	44	11	282	70.5	400
13	Policy to improve social harmony through comfortable urban mobility system	56	14	3	0.8	21	5.3	28	7	292	73.00	400
14	Operation of public transport till late evening (10 PM in sub-urban area and 11 PM in urban area)	66	16.5	6	1.5	7	1.8	31	7.8	290	72.5	400
15	Eliminate syndicate of transport operation	41	10.3	22	5.5	23	5.8	23	5.8	291	72.8	400

Source: Field Survey, 2017

It is inferred that 10 percent of the respondents strongly agreed on **Neighborhood accessibility**, 4.5 percent of the respondents agreed, 7.3 percent of the respondents were neutral, 5 percent of the respondents disagreed and 93.3 percent of the respondents strongly. It is inferred that 12.8 percent of the respondents strongly agreed on **Ease of access**, 2.5 percent of the respondents agreed, 6.3 percent of the respondents were neutral, 4.5 percent of the respondents disagreed and 74 percent of the respondents strongly disagreed. It is inferred that 14.5 percent of the respondents strongly agreed on **Enough walking space**, 1.3 percent of the respondents agreed, 2.5 percent of the respondents were neutral, 7 percent of the respondents disagreed and 74.8 percent of the respondents strongly disagreed. It is inferred that 9.8 percent of the respondents strongly agreed on **Choices of transport modes**, 2.5 percent of the respondents agreed, 2.5 percent of the respondents were neutral, 6.5 percent of the respondents disagreed and 78.8 percent of the respondents strongly disagreed. It is inferred that 10.8 percent of the respondents strongly agreed **Quality of public transport vehicles**, 4.3 percent of the respondents agreed, 0.5 percent of the respondents were neutral, 8.5 percent of the respondents disagreed and 76 percent of the respondents strongly disagreed. It is inferred that 9 percent of the respondents strongly agreed on **Provision of disable friendly transport infrastructure/sidewalk**, 4.3 percent of the respondents agreed, 3.8 percent of the respondents were neutral, 4.3 percent of the respondents disagreed and 79.8 percent of the respondents strongly disagreed. It is inferred that 10.8 percent of the respondents strongly agreed on **Provision of enough cycle lane**, 2.3 percent of the respondents agreed, 1.8 percent of the respondents were neutral, 6.8 percent of the respondents disagreed and 78.5 percent of the respondents strongly. It is inferred that 14.3 percent of the respondents strongly agreed on **Safe transport modes**, 0.5 percent of the respondents agreed, 0.5 percent of the respondents were neutral, 9.8 percent of the respondents disagreed and 75 percent of the respondents strongly disagreed. It is inferred that 10.3 percent of the respondents strongly agreed on **Safe transport infrastructure**, 3.3 percent of the respondents agreed, 5 percent of the respondents were neutral, 9.3 percent of the respondents disagreed and 72.3 percent of the respondents strongly disagree. It is inferred that 13 percent of the respondents strongly agreed on **Reduction in congestion/Free flow mechanism**, 1.8 percent of the respondents agreed, 3.8 percent of the respondents were neutral, 5 percent of the respondents disagreed and 76.5 percent of the respondents strongly disagreed. It is inferred that 11 percent of the respondents strongly agreed on **Mobility culture of commuters**, 4.3 percent of the respondents agreed, 8.5 percent of the respondents were neutral. 5 percent of the respondents disagreed and 71.3 percent of the respondents strongly disagreed. It is inferred that 14 percent of the respondents strongly agreed on **Access to cultural and heritage sites**, 2 percent of the respondents agreed, 2.5 percent of the respondents were neutral, 11 percent of the respondents disagreed and 70.5 percent of the respondents strongly. It is inferred that

14 percent of the respondents strongly agreed on **Policy to improve social harmony through comfortable urban mobility system**, 0.8 percent of the respondents agreed, 5.3 percent of the respondents were neutral, 7 percent of the respondents disagreed and 73 percent of the respondents strongly disagreed. It is inferred that 16.5 percent of the respondents strongly agreed on **Operation of public transport till late evening (10 PM in sub-urban area and 11 PM in urban area)**, 1.5 percent of the respondents, 1.8 percent of the respondents were neutral, 7.8 percent of the respondents disagreed and 72.5 percent of the respondents strongly disagreed. It is inferred that 10.3 percent of the respondents strongly agreed on **Eliminate syndicate of transport operation**, 5.5 percent of the respondents agreed, 5.8 percent of the respondents were neutral, 5.8 percent of the respondents disagreed and 72.8 percent of the respondents strongly disagreed.

It is revealed that majority of respondents strongly disagree about the existing indicator under Social/Cultural Sustainability.

Economic Sustainability: The view of respondents about the different indicators as an existing position under economic sustainability criteria are presented below

Table No. 3: Indicators under economic sustainability criteria- Existing

SN	Variables	Strongly Agree		agree		Neutral		Disagree		Strongly disagree		Total
		N	%	N	%	N	%	N	%	N	%	
1	Affordable to the people	40	10	19	4.8	20	5	270	67.5	51	12.8	400
2	User pays policy	45	11.3	14	3.5	34	8.5	252	63.0	55	13.8	400
3	Meets life cycle cost (investment, operation & maintenance)	51	12.8	8	2	20	5	263	65.8	58	14.5	400
4	Supportive to local business and entrepreneurship	49	12.3	13	3.3	37	9.3	254	63.5	47	11.8	400
5	Reduction on dependency of use of fossil fuel	56	14	8	2	36	9	239	59.8	61	15.3	400
6	Subsidize development of Non-motorized transport infrastructures (cycle path, sidewalks, pedestrianization)	45	11.3	17	4.3	24	6	255	63.8	59	14.8	400
7	PPP for development of transport infrastructure	43	10.8	31	7.8	20	5	249	62.3	57	14.3	400
8	PPP for operation of public transport systems (BRT, MRT)	37	9.3	40	10	20	5	249	62.3	54	13.5	400
9	Provision of budget for social infrastructures	50	12.5	12	3	24	6	269	67.3	45	11.3	400
10	Production of NMT modes in country	49	12.3	29	7.3	8	2	264	66	50	12.5	400

Source: Field Survey, 2017

It is inferred that 10 percent of the respondents strongly agreed on **Affordable to the people**, 4.8 percent of the respondents agreed, 5 percent of the respondents were neutral, 67.5 percent of the respondents disagreed and 12.8 percent of the respondents strongly disagreed. It is inferred that 11.3 percent of the respondents strongly agreed on **User pays policy**, 3.5 percent of the respondents agreed, 8.5 percent of the respondents were neutral, 63 percent of the respondents disagreed and 13.8 percent of the respondents strongly disagreed. It is inferred that 12.8 percent of the respondents strongly agreed **Meets life cycle cost (investment, operation & maintenance)**, 2

percent of the respondents agreed, 5 percent of the respondents were neutral, 65.8 percent of the respondents disagreed and 14.5 percent of the respondents strongly disagreed. It is inferred that 12.3 percent of the respondents strongly agreed **Supportive to local business and entrepreneurship**, 3.3 percent of the respondents agreed 9.3 percent of the respondents were neutral, 65.5 percent of the respondents disagreed and 11.8 percent of the respondents strongly disagreed. It is inferred that 14 percent of the respondents strongly agreed **Reduction on dependency of use of fossil fuel**, 2 percent of the respondents agreed, 9 percent of the respondents were neutral, 59.8 percent of the respondents disagreed and 15.3 percent of the respondents strongly disagreed. It is inferred that 11.3 percent of the respondents strongly agreed on **Subsidize development of Non-motorized transport (NMT) infrastructures (cycle path, sidewalks and pedestrianization)**, 4.3 percent of the respondents agreed, 6 percent of the respondents were neutral, 63.8 percent of the respondents disagreed and 14.8 percent of the respondents strongly disagreed. It is inferred that 10.8 percent of the respondents strongly agreed on **PPP for development of transport infrastructure**, 7.8 percent of the respondents agreed, 5 percent of the respondents were neutral, 62.3 percent of the respondents disagreed and 14.3 percent of the respondents strongly disagreed. It is inferred that 9.3 percent of the respondents strongly agreed **PPP for operation of public transport systems (BRT, MRT)**, 10 percent of the respondents agreed, 5 percent of the respondents were neutral, 62.3 percent of the respondents disagreed and 13.5 percent of the respondents strongly disagreed. It is inferred that 12.5 percent of the respondents strongly agreed **Provision of budget for social infrastructures**, 3 percent of the respondents agreed, 6 percent of the respondents were neutral, 67.3 percent of the respondents disagreed and 11.3 percent of the respondents strongly disagreed. It is inferred that 12.3 percent of the respondents strongly agreed **PPP Production of NMT modes in country**, 7.3 percent of the respondents agreed, 2 percent of the respondents were neutral, 66 percent of the respondents disagreed and 12.5 percent of the respondents strongly disagreed.

It is revealed that majority of respondents were disagreed about the existing indicator under Economic Sustainability.

IV. INFRASTRUCTURE/ENGINEERING/TECHNICAL SUSTAINABILITY

The view of respondents about the different indicators as an existing position under Infrastructure/Engineering/Technical sustainability criteria are presented below

Table No. 4: Indicators under Infrastructure/Engineering/Technical sustainability criteria-

SN	Variables	Strongly Agree		agree		Neutral		Disagree		Strongly disagree		Total
		N	%	N	%	N	%	N	%	N	%	
1	Urban mobility planning based on sustainable policy	54	13.5	14	3.5	10	2.5	266	66.5	56	14	400
2	Development of transport infrastructures (roads, intersections, cycle path, sidewalks)	52	13	16	4	16	4	251	62.8	65	16.3	400
3	Quality of transport infrastructure	44	11	15	3.8	-	-	284	71	57	14.3	400
4	Develop technical standards and norms for urban transportation	54	13.5	5	1.3	13	3.3	280	70	48	12	400
5	Efficient traffic management for free flow of vehicles	54	13.5	5	1.3	16	4	269	67.3	56	14	400
6	Use of state of the art/smart technologies	38	9.5	25	6.3	-	-	250	62.5	87	21.8	400

Source: Field Survey, 2017

It is inferred that 13.5 percent of the respondents strongly agreed on **Urban mobility planning based on sustainable policy**, 3.5 percent of the respondents agreed, 2.5 percent of the respondents were neutral, 66.5 percent of the respondents disagreed and 14 percent of the respondents strongly disagreed. It is inferred that 13 percent of the respondents strongly agreed **Development of**

transport infrastructures (roads, intersections, cycle path, sidewalks), 4 percent of the respondents agreed, 4 percent of the respondents were neutral, 62.8 percent of the respondents disagreed and 16.3 percent of the respondents strongly disagreed. It is inferred that 11 percent of the respondents strongly agreed on **Quality of transport infrastructure**, 3.8 percent of the respondents agreed, 0 percent of the respondents were neutral, 71 percent of the respondents disagreed and 14.3 percent of the respondents strongly disagreed. It is inferred that 13.5 percent of the respondents strongly agreed on **Develop technical standards and norms for urban transportation**, 1.3 percent of the respondents agreed, 3.3 percent of the respondents were neutral, 70 percent of the respondents and 12 percent of the respondents strongly disagreed. It is inferred that 13.5 percent of the respondents strongly agreed **Efficient traffic management for free flow of vehicles**, 1.3 percent of the respondents agreed, 4 percent of the respondents were neutral, 67.3 percent of the respondents disagreed and 14 percent of the respondents strongly disagreed. It is inferred that 9.5 percent of the respondents strongly agreed on **Use of state of the art/smart technologies**, 6.3 percent of the respondents agreed 0 percent of the respondents were neutral 62.5 percent of the respondents disagreed and 21.8 percent of the respondents strongly disagreed. It is revealed that majority of respondents were disagreed about the existing indicator under Infrastructure/Engineering/Technical Sustainability.

V. INSTITUTIONAL SUSTAINABILITY

The view of respondents about the different indicators as an existing position under Institutional sustainability criteria are presented below

Table No. 5: Indicators under Institutional sustainability criteria- Existing

SN	Variables	Strongly Agree		agree		Neutral		Disagree		Strongly disagree		Total
		N	%	N	%	N	%	N	%	N	%	
1	Coordination among government institutions responsible for planning, development, operation, maintenance, regulation of urban transport system (DOR, municipalities, traffic police, DTM)	38	9.5	15	3.8	12	3	289	72.3	46	11.5	400
2	Coordination among other institutions for operation of public transportation (vehicle operators/entrepreneurs, vehicle dealers/importers, manufacturers)	37	9.3	13	3.3	15	3.8	290	72.5	45	11.3	400
3	Development, formulation/updating of urban transport policy	36	9	14	3.5	13	3.3	276	69	61	15.3	400
4	Adopt the sustainability criteria for urban transportation/mobility	47	9.3	14	3.5	12	3	261	65.3	76	19	400
5	Develop necessary Acts, rules, regulations, guidelines, manuals to enforce sustainability criteria for urban transportation.	43	10.8	13	3.3	15	3.8	258	64.5	71	17.8	400
6	Systematic operation of public transport system	53	13.3	7	1.8	11	2.8	276	69	53	13.3	400
7	Establish dedicated urban transportation unit all municipalities	50	12.5	9	2.3	11	2.8	275	68.8	55	13.8	400

8	Place adequate human resources (technical, managerial and administrative) in transportation unit.	54	13.5	5	1.3	8	2	276	69	57	14.3	400
9	Train all the human resources to equip with urban transportation and mobility skill and knowledge.	47	11.8	14	3.5	20	5	30	7.5	289	72.3	400
10	Establish systematic coordination mechanism with community for urban transportation and mobility	73	18.3	3	0.8	16	4	21	5.3	287	71.8	400

Source: Field Survey, 2017

It is inferred that 9.5 percent of the respondents strongly agreed on **Coordination among government institutions responsible for planning, development, operation, maintenance, regulation of urban transport system (DOR, municipalities, traffic police, DTM)**, 3.8 percent of the respondents agreed that, 3 percent of the respondents were neutral, 72.3 percent of the respondents disagreed and 11.5 percent of the respondents strongly disagreed. It is inferred that 9.3 percent of the respondents strongly agreed on **Coordination among other institutions for operation of public transportation (vehicle operators/entrepreneurs, vehicle dealers/importers, manufacturers)**, 3.3 percent of the respondents agreed 3.8 percent of the respondents were neutral, 72.5 percent of the respondents disagreed and 11.3 percent of the respondents strongly disagreed. It is inferred that 9 percent of the respondents strongly agreed on **Development, formulation/updating of urban transport policy**, 3.5 percent of the respondents agreed, 3.3 percent of the respondents were neutral, 69 percent of the respondents disagreed and 15.3 percent of the respondents strongly disagreed. It is inferred that 9.3 percent of the respondents strongly agreed on **Adopt the sustainability criteria for urban transportation/mobility**, 3.5 percent of the respondents agreed, 3 percent of the respondents were neutral, 65.3 percent of the respondents disagreed and 19 percent of the respondents strongly disagreed. It is inferred that 10.8 percent of the respondents strongly agreed on **Develop necessary Acts, rules, regulations, guidelines, manuals to enforce sustainability criteria for urban transportation**, 3.3 percent of the respondents agreed, 3.8 percent of the respondents were neutral, 64.5 percent of the respondents and 17.8 percent of the respondents strongly disagreed. It is inferred that 11.3 percent of the respondents strongly agreed **Systematic operation of public transport system**, 1.8 percent of the respondents agreed, 2.8 percent of the respondents were neutral. 69 percent of the respondents disagreed and 13.3 percent of the respondents strongly disagreed. It is inferred that 12.5 percent of the respondents strongly agreed on **Establish dedicated urban transportation unit all municipalities** 2.5 percent of the respondents agreed, 2.8 percent of the respondents were neutral, 68.8 percent of the respondents disagreed and 13.8 percent of the respondents strongly disagreed. It is inferred that 13.5 percent of the respondents strongly agreed **Place adequate human resources (technical, managerial and administrative) in transportation unit**, 1.3 percent of the respondents agreed, 2 percent of the respondents were neutral, 69 percent of the respondents disagreed that and 14.3 percent of the respondents strongly disagreed. It is inferred that 11.8 percent of the respondents strongly agreed on **Train all the human resources to equip with urban transportation and mobility skill and knowledge**, 3.5 percent of the respondent agreed, 5 percent of the respondents were neutral, 7.5 percent of the respondents disagreed and 72.3 percent of the respondents strongly disagreed. It is inferred that 18.3 percent of the respondents strongly agreed on **Establish systematic coordination mechanism with community for urban transportation and mobility**, 0.8 percent of the respondents agreed, 4 percent of the respondents were neutral, 5.3 percent of the respondents disagreed and 71.8 percent of the respondents strongly disagreed. It is revealed that majority of respondents disagreed about the existing indicator under institutional sustainability

VI. GOOD GOVERNANCE

The view of respondents about the different indicators as an existing position under Good governance sustainability criteria are presented below

Table No. 6: Indicators under Good governance sustainability criteria-

SN	Variables	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree		Total
		N	%	N	%	N	%	N	%	N	%	

1	Community awareness in mobility.	48	12	14	3.5	14	3.5	36	9	288	72	400
2	Consultation mechanism with stakeholders and community	55	13.8	11	2.8	17	4.3	31	7.8	286	71.5	400
3	Transparent decision-making system in all levels - planning, procurement, selection, implementation, operation and maintenance	51	12.8	16	4	17	4.3	24	6	292	73	400
4	Social impact assessment	47	11.8	17	4.3	20	5	37	9.3	279	69.8	400
5	Accountability/auditing	50	12.8	18	4.5	4	1	40	10	288	72	400
6	Compliance of all guidelines - environmental, social, economic, technical, institutional.	63	15.8	12	3	17	4.3	19	4.8	289	72.3	400
7	Ensure fairness in all level of decision making	65	16.3	9	2.3	17	4.3	18	4.5	291	72.8	400

Source: Field Survey, 2017

It is inferred that 12 percent of the respondents strongly agreed on **Community awareness in mobility**, 3.5 percent of the respondents agreed, 3.5 percent of the respondents were neutral, 9 percent of the respondents disagreed and 72 percent of the respondents strongly disagreed. It is inferred that 13.8 percent of the respondents strongly agreed on **Consultation mechanism with stakeholders and community**, 2.8 percent of the respondents agreed, 4.3 percent of the respondents were neutral, 7.8 percent of the respondents disagreed and 71.5 percent of the respondents strongly disagreed. It is inferred that 12.8 percent of the respondents strongly agreed on **Transparent decision-making system in all levels - planning, procurement, selection, implementation, operation and maintenance**, 4 percent of the respondents agreed, 4.3 percent of the respondents were neutral, 6 percent of the respondents disagreed and 73 percent of the respondents strongly disagreed. It is inferred that 11.8 percent of the respondents strongly agreed on **Social impact assessment**, 4.3 percent of the respondents agreed, 5 percent of the respondents were neutral, 9.3 percent of the respondents disagreed and 69.8 percent of the respondents strongly disagreed. It is inferred that 12.8 percent of the respondents strongly agreed on **Accountability/auditing**, 4.5 percent of the respondents agreed, 1 percent of the respondents were neutral 10 percent of the respondents disagreed, and 72 percent of the respondents strongly disagreed. It is inferred that 15.8 percent of the respondents strongly agreed on **Compliance of all guidelines - environmental, social, economical, technical, institutional**, 3 percent of the respondents agreed, 4.3 percent of the respondents were neutral, 4.8 percent of the respondents disagreed and 72.3 percent of the respondents strongly disagreed. It is inferred that 16.3 percent of the respondents strongly agreed on **Ensure fairness in all level of decision making**, 2.3 percent of the respondents agreed, 4.3 percent of the respondents were neutral, 4.5 percent of the respondents disagreed and 72.8 percent of the respondents strongly disagreed. It is revealed that majority of respondents were strongly disagreed about the existing indicator under good governance.

V. CONCLUSION

The urban transportation policy of the Kathmandu valley can be revisited in the backdrop of these indicators. Transportation problems mainly arise due to the imbalance between capacity or supply of transport facilities and the demand from the people. Traffic congestion, travel delays and dissatisfaction amongst the travelers are all the results of this imbalance. These are accompanied by environmental problems like air and noise pollution. No motorized transportation modes (which mostly include pedestrians and cyclists) have become the most vulnerable in the present vehicular dominant transportation system. They are deprived of safe movement on roads, due to growing traffic. This causes increase in the number of accidents, pedestrians being the victims most of the times. Travelers spend money on their travel directly (traveling expenses) or indirectly (local taxes) but are unable to get desired satisfaction. There is a gap between increasing traffic and existing infrastructure (in terms of bridges, roads, traffic control devices, subways etc). This gap is increasing leading to unsustainable condition, which prevents the smooth flow of traffic and healthy environmental conditions, suppressing economical development. Concept of sustainability thus arises from the need of a transportation system which would efficiently cater to the needs and travel demands of citizens. Current study focused for the identification of the overall sustainability

parameters those have the influence in urban transportation, assessing the transport infrastructure required to accommodate the free flow of required various modes of traffic in Kathmandu valley, examining the state of urban transportation in Kathmandu valley in terms of sustainability and developing sustainability criteria suitable to be adopted to manage urban transportation for Kathmandu valley.

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